farm near that city for the erection of a new university. The location consists of 100 acres overlooking London. Building operations will not be commenced until the end of the war, but plans will be prepared and the grounds laid out.

Cassius Jackson Keyser, professor of mathematics in Columbia University, and M. W. Haskell, professor of mathematics in the University of California, will exchange chairs for the half-year from August to December, 1916.

Mr. Eliot Blackwelder, professor of historical geology at the University of Wisconsin, has been appointed professor of geology and head of the department, at the University of Illinois. The appointment will take effect on September 1.

There have been promoted to assistant professorships at Yale University, Joshua Irving Tracey, Ph.D., in mathematics and Alexander Louis Prince, M.D., in physiology.

At Rutgers College, Dr. F. E. Chidester, associate professor of zoology, has been advanced to a professorship and made chairman of the course in biology; Dr. A. R. Moore, associate professor of physiology at Bryn Mawr, has been made professor of physiology and head of the newly created department of physiology; and Richard Ashman has been appointed assistant in zoology.

Dr. Wilbur A. Sawyer has been appointed clinical professor of preventive medicine and hygiene in the University of California. He will continue also his work as secretary and executive officer of the California State Board of Health. The object of the creation of this new department is to bring about the most effective possible cooperation between the University of California and the California State Board of Health. The new department will include in its staff Dr. James G. Cumming, director of the Bureau of Communicable Diseases of the State Board of Health, who will become also assistant professor of preventive medicine and hygiene, and, as lecturers in preventive medicine and hygiene, Dr. William C. Hassler, Dr. John N. Force, Dr. Jacob N. Geiger, assistant director of the Bureau of Communicable Diseases, and Chester G. Gillespie, C.E., director of the Board of Sanitary Engineering of the California State Board of Health.

Among promotions at Stanford University are: To the rank of associate professor, John P. Mitchell in chemistry, Leonas L. Burlingame in botany and Rennie W. Doane in entomology; to rank of assistant professor, Hayes W. Young in metallurgy, John F. Cowan in surgery and Perley A. Ross in physics.

DISCUSSION AND CORRESPONDENCE

THOSE FUR SEAL BONES

"Millions of dollars' worth of seal and sea lion bone deposits on the shores of the Pribilof Islands, a vast store of government-owned fertilizer available for practical use," is the way the Washington dispatch of February 28 comments on a report said to have been made by the secretary of commerce to the House committee on merchant marine. One of these deposits is said to be "a mile long by half a mile wide and fully six feet deep." This suggests 83,000,000 cubic feet of bone—a wonderful deposit, indeed! To complete the picture it is stated that raw ground bone was bringing $35 a ton in December.

This sounds like a very important discovery. It will be too bad if it proves not to be true. The dispatch indicates that the deposits "have not been fully surveyed." It is to be feared that the completed surveys will be disappointing.

It is a fact that since the discovery of the Pribilof Islands in 1786 upwards of 5,000,000 fur seals have been killed and their carcasses left to rot on the killing grounds. These are the bones which are referred to. There are no prehistoric bones, since the death of the adult animals from natural termination of life is at sea, under the stress of the winter migration. Of the five million animals killed about one half were deposited on the great killing ground near the village on St. Paul Island.

The rest are distributed over a considerable number of widely separated fields, for the most part unimportant.

The adult male fur seal attains a weight of 400 to 500 pounds, and if this were the class of animal killed, a considerable deposit of bone would have resulted from the carcasses of the five million animals. It is, however, the immature males of two and three years that have been killed. These are animals of 50 to 60 pounds weight and their bones still contain a large proportion of animal matter. The seal is an animal adapted for life in the water, like a fish, and its bones are small and fragile. In a green state they constitute perhaps ten pounds of the weight. Weathered for a few seasons on the sands of St. Paul, or otherwise dried out, they would not exceed three to five pounds in weight. In other words 500 of the animals might give a ton of bone, if it was regularly cared for. Left to chance, the yield would naturally be less. The five million animals would therefore at best represent about 10,000 tons of bone, or at the price of $35 a ton suggested, a total value of $350,000. Half of this would be found in the St. Paul village deposit. This is on the assumption that something like the full product of bone could be recovered.

It would not be all profit; there would be expense in getting the bone out, and especially in shipping it to some commercial port. The Pribilof Islands have no harbors. Ships must anchor a mile or so off shore and all cargo must be lightered in or out in small boats. The islands are small and a few hours' stiff wind will break up a landing any day, twenty-four hours', all landings. On the approach of a storm the ship must pull anchor and put to sea. Fogs are frequent and persistent and a vessel may have to wait days for an observation of the sun to enable it to find its way back to the islands. In the summer of 1914 the supply ship of the department of commerce spent 23 days, at a cost to the government of $250 a day, about these island in landing a cargo of a few score tons of freight. The revenue cutter service in 1911 left the bones of a good ship on one of the reefs of St. Paul. The getting of this supply of bone out (assuming that its exists) would be a thing fraught with difficulty and danger.

But the most probable thing about the whole matter is that the bone deposit does not exist. In the season of 1912 the writer witnessed the sinking of a six foot trench through a considerable portion of the main field of alleged deposit for the purpose of laying a water pipe. No bone was found except at or near the surface and here in negligible quantity. This was a matter of surprise and comment because on theoretical grounds we had expected to find layer on layer of bones representing the successive annual killings which had been going on here for over a century. Nothing, however, was found but the coarse lava sand which underlies the field to a depth of fifteen to twenty feet. Into this sand, evidently, the rain has washed the dust of the bones as they quickly disintegrated.

A more tangible thing associated with this great killing field of St. Paul Island is the oil, rendered by the elements from the blubber encasing the seal carcasses. This has soaked into the ground and mingled with the water that underlies the field giving to it the appearance of thick brown soup. The villagers of St. Paul have had to locate their wells far beyond this field to get pure water. A claim that there were millions of dollars' worth of seal oil stored in reservoirs underneath the Pribilof Island killing fields would have had a more solid basis of fact to rest upon. Perhaps the revelation of this great natural resource is held in reserve.

One interesting thing in connection with these rather mythical bone deposits of the seal islands is that since 1912 no additions have been made to them. The fur seal law of that year stopped commercial sealing. In 1911 the last deposit—the bones of 12,000 seals—was laid down; it represented about thirty tons of dried bone, worth, at $35 a ton, about $1,050. Incidentally the 12,000 seal skins taken from these animals brought the government $35 each, or the reputed price of a ton of raw ground bone. The value of the seal skins, which may in this case be considered a

by-product of the government seal boneyard, was $423,000. The bones of 10,000 to 12,000 seals might have been deposited each year since to increase the store of "government-owned fertilizer," but the fur-seal law has prevented the secretary of commerce from killing them. In addition to the loss of the bone, there has been the loss in seal skins, which in the meantime have risen to a price of $50 each. Incidentally these seal skins, if they could be taken, would also be valuable cargo for the ships "that may be provided by the pending administration ship purchase bill," and less troublesome than bone to handle.

GEORGE ARCHIBALD CLARK

MATERIALS IN A TON OF KELP

THE seriousness of the current shortage of potash gives increased importance to a careful consideration of the American sources of it. The following table gives in pounds the quantities of the materials mentioned that are contained in a ton (2,000 pounds) of fresh kelp. The three species mentioned are the ones that are harvestable in commercial quantities along the Pacific coast of North America. The supply available on the California coast is mainly *Macrocystis,* that in the Puget Sound region is mainly *Nereocystis,* while that in southern Alaska is *Nereocystis, Macrocystis* and *Alaria.* In western Alaska the supply is *Nereocystis* and *Alaria.*

	Water	Potassium Chloride	Other Salts	Iodine	Algin	Crude Fiber	Nitrogen
Nereocystis luetkeana	1,834	52.7	25.1 to 37.7	0.22	23.4	8.4	2.9
Macrocystis pyrifera	1,736	52.5	26.7 to 55.7	0.61	44.4	19.3	4.3
Alaria fistulosa	1,726	39.3	27.6	Trace	No data	No data	7.1

The computations are made from data obtained by workers in the United States Bureau of Soils, the University of California and the University of Washington.

The algin here reported is the adhesive material that can be dissolved in sodium carbonate and precipitated with acids. The crude fiber reported was approximately half cellulose.

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THE TOXICITY OF BOG WATER

THE writer has found by experiments that filtered bog waters show a precipitate when saturated with ammonium sulphate, disodium hydrogen phosphate, or sodium chloride. The filtrate from this when freed from the salt by dialysis did not prove toxic in solution cultures to the root hairs of *Tradescantia,* while the untreated bog water did prove toxic. The matter precipitated by these salts is not volatile at 100° C.

Since the specific gravity of bog water is 1.000, and its osmotic pressure is very low it seems probable that the substances present in this water are in a colloidal state. The above data tend to confirm this view and suggest that the colloidal matter may be a large factor in the toxicity of bog waters.

The waters used were obtained from sphagnum bogs in the Puget Sound region and Alaska.

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EXHIBITION OF THE ROYAL PHOTOGRAPHIC SOCIETY

TO THE EDITOR OF SCIENCE: The sixty-first annual exhibition of the Royal Photographic Society will be held as usual in August and September of this year. In order to facilitate the collection and forwarding of scientific exhibits I have been appointed one of the judges in the scientific section of the forthcoming exhibition and have made arrangements to receive photographs from American workers and to forward them to London, thus relieving the photographer of all difficulty and expense.

I should be very glad to hear from any American photographer who wishes to enter photographs in the scientific section of the exhibition of the Royal Photographic Society and to forward him an entry form.

For some years now the American exhibit in the scientific section has been a comprehensive one and of great interest to European workers